

What is claimed is:

1. A method of forming quantum dots in a semiconductor device, the method comprising:

adsorbing metal clusters on a silicon substrate by controlling density thereof;

growing silicon by heating the substrate on which the metal clusters are adsorbed;

removing the metal clusters;

forming a silicon oxide layer on the substrate; and

depositing polysilicon on the oxide layer and patterning the polysilicon and the oxide layer.

2. A method as defined by claim 1, wherein a metal of the metal clusters is selected from the group consisting of gold, silver, and a transition metal.

3. A method as defined by claim 1, wherein the silicon is grown by chemical vapor deposition (CVD) method using the metal clusters as a mask.

4. A method as defined by claim 1, wherein the silicon condenses and grows only between the metal clusters and the silicon substrate and nano-line of the silicon is formed vertically on the surface.

5. A method as defined by claim 1, wherein the size of the metal clusters is between about 5 and 50 nanometers.

6. A method as defined by claim 1, wherein the silicon oxide layer is formed by thermal oxidation method.

7. A method as defined by claim 6, wherein the thermal oxidation method uses O₂ gas or NO gas at a temperature of about 800 to 1000 °C.